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FLEX CROPPING FOR FORAGE AND N FIXATION

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Flex Cropping for Forage and N Fixation

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Title of study
Flex Cropping for Forage and N Fixation

Summary
The objective of this study is to look at the value of different crops when marketed very differently and to show the effect each has on the following recrop year. We focussed on three markets or end uses; cropping for forage, cropping for seed, or cropping as greenfallow for recrop nitrogen. Some of the crops studied had relevance in all three markets (eg. Grande pea for seed, forage, and greenfallow), where others did not (eg. Barley as greenfallow). With several different avenues to explore after seeding a crop, a producer is not locked into a predetermined end use. As environmental conditions and markets change, a grower has the freedom to adapt to optimize the value of the crop. This study looks at two phases in a rotation for a three year period. Based on average crop values, we determined average net values per acre for each crop, depending on end use, including its respective recrop value. Phase one looks at the average gross value of numerous crops in different markets over a three year period. Phase two looks at the recropping affects on phase one stubbles, and compares the two year average gross value of both phases. Basic inputs (seed, fertilizer, chemical, and fuel) are also shown for each crop and respective recrop, and a two year net return per acre is calculated. There are many fixed costs and other costs (depreciation, taxes, insurance, grain storage, etc.) that are not included in this calculation due to variability among individual operations.

In general, the crops used for seed resulted in a better return that the crops used for green fallow or forage. In recent years the green feed prices have been low. These markets can change quickly, and an increase in feed prices would favour forages. As well, if durum prices were to rise, the green fallow system would benefit since it resulted in the best recrop yields and proteins. Using specific crop or forage yields found in this study, along with the corresponding recrop yields and protein levels, individuals can substitute various pricing scenarios and customize a model to fit their operation.

Background and objectives of study
The objective of this study is to look at the value of different crops when marketed very differently and to show the effect each has on the following recrop year. We focussed on three markets or end uses; greenfallow, forage, and seed. Some of the crops studied had relevance in all three markets (eg. Grande pea for seed, forage, and greenfallow), where others did not (eg. Barley as greenfallow). With several different avenues to explore after seeding a crop, a producer is not locked into a predetermined end use. As environmental conditions and markets change a grower has the freedom to adapt to optimize the value of the crop. For example, the cattle industry in 2003 was hit hard, as were related industries including livestock feeds. This creates the potential for a very volatile marketplace for these industries. The cowherd in Saskatchewan may fluctuate in size for a number of years. A safe, resilient, yet reliable feed source will be needed to compensate for these dynamics. The use of annual forages will definitely play a major role. Introducing a forage crop into an annual rotation for grazing and/or hay production is one possible option in a rotational cropping system. This will allow producers to diversify into cattle as markets dictate without taking land out of annual crop production.

The use of a legume as green fallow will also give producers another rotation option targeted towards lowering input costs. Limited amount of work on green manure at a field scale level has been done in the brown soil zone. Fertilizer prices have increased steadily over the past years with the increase in energy costs. Producers are looking for an economical way to enhance fertility levels on their farm. The shift towards direct seeding and continuous cropping has increased interest in the use of green manure. The use of green manure allows the producer to manage weeds, save moisture (compared to growing a full season crop), and lower input costs for the next year. A green fallow operation, however, must be done in a matter that is cost effective.

The objective of this study is to compare different annual crops and their potential end use, and show the recropping affects of a crop that has been green fallowed, harvested for forage, or harvested for seed.

Study description

Phase one of the study consisted of growing a crop for seed production, for green feed, and for greenfallow. Phase two consisted of a durum recrop on phase one stubbles. A randomized complete block design replicated three times was used consisting of 13 forage treatments, 6 green fallow treatments, and 9 treatments harvested for seed as follows:

Phase one

Harvested for forage: (using a motting machine)
Grande pea, 40-10 silage pea, Greenfix, Faba bean, Millet, Forage oat, Forage barley, Triticale, 40-10 silage pea and forage oat, 40-10 silage pea and barley, 40-10 silage pea and triticale, Forage corn, Canola .

Terminating as green fallow: (glyphosate)
Grande pea, 40-10 silage pea, Greenfix, Faba bean, Canola (non N fixing check), Chem fallow (check).

Harvested for seed: (using the plot harvester)
Grande pea, 40-10 silage pea, Greenfix, Millet, Forage oats, Forage barley, Triticale, Faba bean, Canola.

Phase two

All treatments were recropped the following year to durum. All treatments received a blanket fertilizer application of 100 lbs of 30-15-0-6.

Data collected: Phase one yield (seed or forage biomass), Phase two recrop seed yield, recrop seed protein.

Results and conclusions

Data collected include biomass yield and seed yield as shown in the following tables. As well, the tables shows an average gross dollar value per acre from each crop, an average gross value of each respective durum recrop, and the two year total. Basic inputs (seed, fertilizer, chemical, and fuel) are also shown for each crop and respective recrop, and a two year net return per acre is calculated. There are many fixed costs and other costs (depreciation, taxes, insurance, grain storage, etc.) that are not included in this calculation due to variability among individual operations. In general, the crops used for seed resulted in a better return that the crops used for green fallow or forage. In recent years the green feed prices have been low. These markets can change quickly, and an increase in feed prices would favour forages. If durum prices were to rise, the green fallow system would benefit since it resulted in the best recrop yields and proteins.

Table 1. Net return for crops grown for seed, including a durum recrop.

Crop For Seed	CROP (Phase 1)			RECROP (Phase 2)				TWO YEAR	INPUTS	TWO YEAR
	Bu/ac	$/Bu	Crop $/ac	Recrop Bu/ac	Protein	Recrop $/Bu	Recrop $/ac	TOTAL $/ac	TOTAL $/ac	NET $/ac
Grande pea	37.8	$4.00	$151.00	52.3	10.7	$4.01	$209.86	$360.86	$166.50	$194.36
Greenfix	20.9	$8.40	$175.53	47.0	10.6	$4.01	$188.57	$364.09	$172.50	$191.59
Faba bean	21.8	$5.40	$117.59	53.1	10.2	$4.01	$212.98	$330.57	$168.50	$162.07
Pea 40-10	28.7	$4.00	$114.98	47.8	10.7	$4.01	$191.48	$306.47	$166.50	$139.97
Forage oats	67.8	$1.76	$119.41	41.9	9.4	$4.01	$168.08	$287.49	$153.00	$134.49
Triticale	37.3	$2.70	$100.76	40.3	9.9	$4.01	$161.71	$262.47	$153.50	$108.97
Canola	13.1	$6.50	$85.28	44.8	9.6	$4.01	$179.73	$265.02	$160.00	$105.02
Forage barley	51.7	$1.90	$98.27	38.8	9.3	$4.01	$155.64	$253.91	$153.00	$100.91
Millet	11.1	$4.50	$49.79	36.8	9.1	$4.01	$147.38	$197.17	$151.00	$46.17

Table 2. Net return for crops terminated as greenfallow, including a durum recrop.

Greenfallow	CROP (Phase 1)			RECROP (Phase 2)				TWO YEAR	INPUTS	TWO YEAR
	Bu/ac	$/Bu	Crop $/ac	Recrop Bu/ac	Protein	Recrop $/Bu	Recrop $/ac	TOTAL $/ac	TOTAL $/ac	NET $/ac
Chemfallow	0.0	0.0	$0.00	64.3	11.2	$4.06	$261.06	$261.06	$107.50	$153.56
Grande pea	0.0	0.0	$0.00	64.7	11.6	$4.16	$269.15	$269.15	$126.50	$142.65
Faba bean	0.0	0.0	$0.00	65.1	11.5	$4.14	$269.51	$269.51	$128.50	$141.01
Pea 40-10	0.0	0.0	$0.00	61.9	12.2	$4.31	$266.79	$266.79	$126.50	$140.29
Greenfix	0.0	0.0	$0.00	63.3	11.8	$4.21	$266.49	$266.49	$132.50	$133.99
Canola	0.0	0.0	$0.00	57.8	11.0	$4.04	$233.51	$233.51	$140.00	$93.51

Table 3. Net return for crops cut for forages, including a durum recrop.

Forage Crops	FORAGE (Phase 1)			RECROP (Phase 2)				TWO YEAR	INPUTS	TWO YEAR
	Kg/ac	$/tonne	$/ac	Recrop Bu/ac	Protein	Recrop $/Bu	Recrop $/ac	TOTAL $/ac	TOTAL $/ac	NET $/ac
Grande pea	2008	$41.00	$82.33	52.7	10.8	$4.01	$211.45	$293.78	$127.50	$166.28
Pea 40-10	1939	$41.00	$79.48	51.6	11.4	$4.11	$211.87	$291.36	$127.50	$163.86
Triticale-40-10	1954	$41.00	$80.13	50.1	10.9	$4.01	$200.75	$280.87	$123.50	$157.37
Oat - 40-10	2028	$41.00	$83.15	47.2	10.6	$4.01	$189.22	$272.37	$121.50	$150.87
Barley - 40-10	1803	$41.00	$73.92	48.8	10.9	$4.01	$195.74	$269.65	$121.50	$148.15
Greenfix	1316	$41.00	$53.96	50.3	10.8	$4.01	$201.55	$255.51	$133.50	$122.01
Forage barley	2039	$41.00	$83.60	42.2	10.1	$4.01	$169.26	$252.86	$134.00	$118.86
Triticale	2016	$41.00	$82.67	42.2	10.5	$4.01	$169.16	$251.83	$134.50	$117.33
Forage oats	2067	$41.00	$84.74	41.5	10.2	$4.01	$166.38	$251.13	$134.00	$117.13
Faba bean	1342	$41.00	$55.01	47.5	11.3	$4.01	$190.47	$245.48	$129.50	$115.98
Canola	1693	$41.00	$69.42	44.9	10.1	$4.01	$180.05	$249.46	$141.00	$108.46
Millet	1303	$41.00	$53.42	38.2	9.9	$4.01	$153.04	$206.46	$132.00	$74.46
Forage corn	1093	$41.00	$44.81	37.7	10.5	$4.01	$151.22	$196.02	$138.00	$58.02

*Values based on the following commodity prices; Greenfeed $41/ton, Oats $1.76/bus, Barley $1.90/bus, Peas $4.00/bus, 40-10 Silage pea $4.00/bus, Triticale $2.70/bus, AC Greenfix $0.14/lb, Canola $6.50/bus , Faba Bean $5.40/bus, Golden Millet $4.50/bus, Durum $4.01/bus plus respective protein premiums(>11%). Input costs included seed, fertilizer, chemical and fuel used for each crop and their respective durum recrop (Fix costs not included).

To illustrate how price can affect the net returns of each system we can look at Grande pea as an example. If grown for seed (Table 1) we see a net return of $194.36, if terminated as greenfallow (Table 2) we see a return of $142.65, and if cut for forage (Table 3) we see a net return of $166.28. In this scenario the economic advantage of seed production is obvious. If the price of durum was to rise to $6.00 plus protein premiums, seed production would return $298.30, greenfallow would return $287.38, and forage would return $271.03. Economic still favours seed production, however not as obvious. Using the same scenario as above with forage prices at $60/tonne, the two year net return from a forage system would be $309.18, giving this system the economic advantage. Using specific crop or forage yields found in this study, along with the corresponding recrop yields and protein levels, individuals can substitute various pricing scenarios and customize a model to fit their operation.

Greencover crops may have an advantage in a longer rotation (eg. A four year + rotation with other crops) where benefits from increased organic matter may be evident beyond just the recrop year, or under an organic cropping system.

Indication for further development
Price variations and yields (both seed and biomass) have a significant affect on final net values. The outcomes shown in this report reflect the prices at the time, and can change significantly from year to year. Further data/years will better represent both the economic climate, and the seasonal climate.

Information on benefits to producers
When producers have different end use options from a crop, they possess the ability to maximize value from that crop and can minimize overall risk. As markets and weather patterns change producers are able to take advantage of these options to maximize their value per acre and improve their bottom line.

Acknowledgment

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ICAR Database
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